

CLAIMS

What is claimed is:

1. A photodiode array comprising:

5 a substrate having at least a front side and a back side;
 a plurality of photodiodes integrally formed in the
 substrate forming the said array;

10 a plurality of electrical contacts in electrical
 communication with said back side; and

10 a plurality of suction diodes positioned at selected
 locations within the array, wherein the fabrication of said
 array involves a masking process comprising the steps of:

 applying a first p+ mask on said front side and
 applying a second p+ mask on said back side.

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2. The array of claim 1, wherein said substrate is made
of n doped silicon.

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3. The array of claim 1, wherein the substrate is
encircled by a metallic ring.

25 4. The array of claim 3, wherein silicon underneath the
 metal ring is doped with an impurity of a selected
 conductivity type.

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30 5. The array of claim 1, wherein each of said plurality
 of photodiodes and suction diodes have a front surface, back
 surface, and side walls and wherein said side walls are
 covered by a first insulating layer, a first conducting layer,
 and a second insulating layer

6. The array of claim 5 wherein the first insulating layer is an oxide.

5 7. The array of claim 5 wherein the second insulating layer is an oxide.

8. The array of claim 5 wherein the conductive layer is doped poly-silicon.

10 9. The array of claim 5 wherein the second insulating layer is in physical communication with a filler.

15 10. The array of claim 9 wherein the filler is undoped poly-silicon.

11. The array of claim 1 wherein each of said photodiodes has a middle layer juxtaposed between a front layer and a back layer.

20 12. The array of claim 11 wherein said middle layer comprises a doped material of n conductivity type.

25 13. The array of claim 11 wherein said back layer comprises a n+ layer in electrical communication with a metal to form a cathode.

14. The array of claim 11 wherein said front layer comprises a doped material of p+ conductivity type.

30 15. The array of claim 14 wherein front p+ layer is in electrical communication with a metal to form an anode.

16. A photodiode comprising:
a substrate having a front side and a back side;
a front layer;
a back layer; and
5 a detecting region juxtaposed between said front layer
and said back layer; wherein said photodiode is adjacent to a
connection region having a first insulating layer, a first
conducting layer, and a second insulating layer and wherein
said photodiode is made using a process comprising the steps
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applying a first p+ mask on said front side; and
applying a second p+ mask on said back side.

17. The photodiode of claim 16 wherein said process
15 for making the photodiode further comprises the step of using
a p+ photographic mask.

18. The photodiode of claim 16 wherein said process
for making the photodiode further comprises the step of
20 forming said connection region using a hole cutting technique.

19. The photodiode of claim 18 wherein said process
for making the photodiode further comprises the step of
diffusing boron.

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20. The photodiode of claim 19 wherein said process
for making the photodiode further comprises the step of
performing a p+ doping of the connection region.

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21. The photodiode of claim 18 wherein each of
said connection region has a diameter of at or about 125
micron.

22. The photodiode of claim 18 wherein at least one
of said connection regions functions as a conduit for forming
an electrical connection between said first layer and a back
5 surface electrical contact.

23. The photodiode of claim 16 wherein said detection
region comprises a doped material of n conductivity type.

10 24. The photodiode of claim 16 wherein said back
layer comprises a n+ layer in electrical communication with a
metal to form a cathode.

15 25. The photodiode of claim 16 wherein said front
layer comprises a doped material of p+ conductivity type.

20 26. The photodiode of claim 25 wherein said front p+
layer is in electrical communication with a metal to form an
anode.

20 27. A photodiode array comprising:
a substrate having at least a front side and a back side;
a plurality of photodiodes integrally formed in the
substrate forming the said array wherein each of said
photodiodes has a middle layer juxtaposed between a front
25 layer and a back layer;
a plurality of electrical contacts in electrical
communication with said back side; and
a plurality of suction diodes positioned at selected
locations within the array, wherein the fabrication of said
array involves a masking process comprising the steps of:
30 applying a first n+ mask on said front side and

applying a second n+ mask on said back side.

28. The array of claim 27 wherein said middle layer comprises a doped material of p conductivity type.

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29. The array of claim 27 wherein said back layer comprises a p+ layer in electrical communication with a metal to form a anode.

10 30. The array of claim 27 wherein said front layer comprises a doped material of n+ conductivity type.

31. The array of claim 30 wherein front n+ layer is in electrical communication with a metal to form a cathode.

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32. The array of claim 27, wherein the substrate is encircled by a metallic ring.

20 33. The array of claim 32, wherein silicon underneath the metal ring is doped with an impurity of a selected conductivity type.

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25 34. The array of claim 27, wherein each of said plurality of photodiodes and suction diodes have side walls wherein said side walls are covered by a first insulating layer, a first conducting layer, and a second insulating layer

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35. The array of claim 34 wherein the first insulating layer is an oxide.

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36. The array of claim 34 wherein the second insulating layer is an oxide.

37. The array of claim 34 wherein the conductive layer is doped poly-silicon.